

CHRONIC TOXICITY TESTING REPORT
RAYONIER WWTP EFFLUENT

JESUP, GEORGIA

Test Period: July 19-26, 2005

Prepared for:

Rayonier Performance Fibers

Jesup, Georgia

September 2005



CHRONIC TOXICITY TESTING REPORT

**RAYONIER WWTP
EFFLUENT
JESUP, GEORGIA**

Test Period: July 19-26, 2005

Prepared for:

Rayonier Performance Fibers

Prepared by:

**BioTox Laboratory
MACTEC Engineering and Consulting, Inc.**

Kennesaw, Georgia

**September 2005
Project No. 13320-5-9500**



engineering and constructing a better tomorrow

September 7, 2005

Ms. Deborah Oder
Rayonier Performance Fibers
4470 Savannah Highway
Jesup, GA 31545

Subject: **Chronic Toxicity Testing of Rayonier WWTP Effluent**
Jesup, Georgia, July 19-26, 2005
MACTEC Project 13320-5-9500

Dear Ms. Oder:

MACTEC Engineering and Environmental Services (MACTEC) BioTox Laboratory has completed multi-concentration chronic toxicity testing using the water flea, *Ceriodaphnia dubia*, and fathead minnow, *Pimephales promelas*, on Rayonier WWTP Outfall 001/002 effluent samples collected by Rayonier personnel the week of July 17-22, 2005.

The Instream Waste Concentration (IWC) designated for the permitted discharge of Rayonier WWTP Outfall 001/002 effluent is currently 9.11%. Chronic toxicity was not exhibited to water flea survival or reproduction at any of the effluent concentrations tested when statistically compared to the control treatment. The No Observable Effect Concentration (NOEC), or the highest concentration tested that did not exhibit chronic toxicity, was 36.4% effluent for water flea survival and reproduction. When the NOEC is less than the IWC, chronic toxicity is indicated in the effluent samples submitted. In this case, the NOECs for water flea survival and reproduction are not less than the IWC; therefore, chronic toxicity was not indicated to the water flea in the Rayonier WWTP effluent samples.

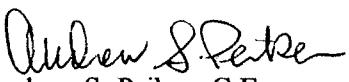
Chronic toxicity was exhibited to fathead minnow survival at the 18.2% effluent concentration when statistically compared to the control treatment. However, there was no indication of chronic toxicity to fathead minnow survival at the 2.28%, 4.56%, 9.11%, or 36.4% effluent concentrations. Since there was no indication of chronic toxicity to survival at the highest effluent concentration (36.4%), we are considering the indication of chronic toxicity to survival at the 18.2% effluent concentration as anomalous, and was not included in determination of the NOEC. The NOEC, therefore, was 36.4% effluent for fathead minnow survival. Chronic toxicity was not exhibited to fathead minnow growth at any of the effluent concentrations when statistically compared to the control treatment. The NOEC, therefore, was 36.4% effluent for fathead minnow growth. The NOECs for fathead minnow survival and growth are not less than the IWC; therefore, chronic toxicity is not indicated to the fathead minnow in the Rayonier WWTP effluent samples.

Results are summarized in the accompanying report (62 total pages). All test results contained herein comply with the requirements of the National Environmental Laboratory Accreditation Conference (NELAC). A summary of test conditions, as well as chemical and physical data, are located in Appendix A (10 total pages). Sample collection locations, dates, times, and temperatures, are located in the attached chain of custody documents in Appendix B (6 total pages). Test organism source data are located in Appendix C (4 total pages). Raw laboratory data and statistical analyses results are located in Appendix D (30 total pages).

If there are any questions, please do not hesitate to contact Andrew S. Peiken at (770) 421-7027.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.


Andrew S. Peiken, C.E.
BioTox Laboratory Manager


Margaret E. Tanner
Environmental Engineer

Attachment: Data Report

TEST SUMMARY

I. Client

Facility Tested: Rayonier
4470 Savannah Highway
Jesup, Georgia 31545

NPDES Number: GA0003620

Samples Tested: Rayonier WWTP Effluent
MACTEC Lab ID: 05-0111-01, 05-0115-01, 05-0116-01

II. Laboratory Accreditation

Laboratory: BioTox Laboratory
MACTEC Engineering and Consulting, Inc.
3200 Town Point Drive N.W., Suite 100
Kennesaw, Georgia 30144

Accreditor: State of Florida, Department of Health
Bureau of Laboratories

Accreditation ID: Lab ID. E87477

Category: Non-Potable Water – Whole Effluent Toxicity

Effective: July 1, 2005 through June 30, 2006

III. Tests Conducted

Test: Water Flea, *Ceriodaphnia dubia*
Chronic Definitive Survival and Reproduction Test
EPA-821-R-02-013, 2002.

Fathead minnow, *Pimephales promelas*
Chronic Definitive Larval Survival and Growth Test
EPA-821-R-02-013, 2002

Test Dates (Times): Water Flea: July 19 (1300) - 26 (1300), 2005
Fathead Minnow: July 19 (1455) - 26 (1600), 2005

Source/Age of Organisms: Water Flea: In-house cultures, ID# CERB01070805 / < 24 hours
Fathead minnow: Aquatic BioSystems, ID# CS981071905 / < 48 hours

Test Concentrations: Control, 2.28%, 4.56%, 9.11%, 18.2%, and 36.4% effluent

Control Water: Water Flea: DMW, Diluted Mineral Water, 20-percent Perrier.
Fathead minnow: LWC, moderately hard reconstituted fresh water.

Deviation From Test Protocol:

Statistical Analyses: Toxstat 3.5 (Gulley, 1996)

IV. Results

Survival and Reproduction Data for Water Fleas Exposed for Seven Days to Rayonier WWTP Outfall 001/002 Effluent, July 19-26, 2005.

% Total Effluent	Survival (%)	Reproduction*
Laboratory Control ^b	100	15.7
2.28	100	21.4
4.56	100	21.8
9.11	100	21.4
18.2	100	20.0
36.4	90.0	11.5
NOEC^c(% Effluent)	36.4	36.4

Prepared by: ASP 9/7/05

Checked by: MET 9/7/05

* Mean number of young (neonates) per original number of female water fleas, excluding those accidentally killed.

^b DMW = Diluted Mineral Water, Moderately Hard Synthetic Freshwater

^c NOEC = No Observable Effect Concentration

Survival and Growth Data for Fathead Minnows Exposed for Seven Days to Rayonier WWTP Outfall 001/002 Effluent, July 19-26, 2005.

% Total Effluent	Survival (%)	Growth* (mg)
Laboratory Control ^b	97.5	0.344
2.28	97.5	0.381
4.56	90.0	0.397
9.11	92.5	0.362
18.2	85.0	0.311
36.4	90.0	0.392
NOEC^c(% Effluent)	36.4	36.4

Prepared by: ASP 9/7/05

Checked by: MET 9/7/05

* Mean dry weight per original number of fish used at test start, excluding those that were accidentally killed or missing.

^b LWC = Laboratory Water Control, Moderately Hard Synthetic Freshwater

^c NOEC = No Observable Effect Concentration

V. Summary

The Instream Waste Concentration (IWC) designated for the permitted discharge of Rayonier WWTP Outfall 001/002 effluent is currently 9.11%. Chronic toxicity was not exhibited to water flea survival or reproduction at any of the effluent concentrations tested when statistically compared to the control treatment. The No Observable Effect Concentration (NOEC), or the highest concentration tested that did not exhibit chronic toxicity, was 36.4% effluent for water flea survival and reproduction. When the NOEC is less than the IWC, chronic toxicity is indicated in the effluent samples submitted. In this case, the NOECs for water flea survival and reproduction are not less than the IWC; therefore, chronic toxicity was not indicated to the water flea in the Rayonier WWTP effluent samples.

Chronic toxicity was exhibited to fathead minnow survival at the 18.2% effluent concentration when statistically compared to the control treatment. However, there was no indication of chronic toxicity to fathead minnow survival at the 2.28%, 4.56%, 9.11%, or 36.4% effluent concentrations. Since there was no indication of chronic toxicity to survival at the highest effluent concentration (36.4%), we are considering the indication of chronic toxicity to survival at the 18.2% effluent concentration as anomalous, and was not included in determination of the NOEC. The NOEC, therefore, was 36.4% effluent for fathead minnow survival. Chronic toxicity was not exhibited to fathead minnow growth at any of the effluent concentrations when statistically compared to the control treatment. The NOEC, therefore, was 36.4% effluent for fathead minnow growth. The NOECs for fathead minnow survival and growth are not less than the IWC; therefore, chronic toxicity is not indicated to the fathead minnow in the Rayonier WWTP effluent samples.

VI. Quality Assurance

Ceriodaphnia dubia, NaCl Reference Toxicant, RT#139CCD, 7/20/05

Survival: IC₂₅ = 2,571 mg/L NaCl (**ACCEPTABLE**)

IC₂₅ Range of Acceptability = 1,410 to 3,290 mg/L NaCl

Reproduction: IC₂₅ = 1,173 mg/L NaCl (**ACCEPTABLE**)

IC₂₅ Range of Acceptability = 630 to 1,510 mg/L NaCl

Pimephales promelas, NaCl Reference Toxicant, RT#166CPP, 7/19/05

Survival: IC₂₅ = 3,650 mg/L NaCl (**ACCEPTABLE**)

IC₂₅ Range of Acceptability = 1,230 to 6,070 mg/L NaCl

Growth: IC₂₅ = 2,369 mg/L NaCl (**ACCEPTABLE**)

IC₂₅ Range of Acceptability = 1,100 to 4,140 mg/L NaCl

GLOSSARY AND ABBREVIATIONS

Acute	Involving a stimulus severe enough to rapidly induce a response; in toxicity tests, a response observed in 96 hours or less typically is considered acute.
Chronic	Involving a stimulus that lingers or continues for a relatively long period of time, often one-tenth of the life span or more. A chronic effect can be lethality, growth, reduced reproduction, etc.
Chronic	A numeric value representing the geometric mean of the NOEC (No Observed Effect ValueConcentration) and the LOEC (Lowest Observed Effect Concentration) by chronic toxicity testing. The chronic value is an estimate of the toxicant concentration that will be the actual no effect concentration based on the chronic effect tested.
Critical Value	Minimum numeric value for a toxicity test endpoint (i.e., survival, growth, or reproduction) below which a given test result will be statistically significantly different from the control value.
DMW	Diluted Mineral Water
EC	Effective Concentration, a point estimate of the toxicant concentration that would cause an adverse response such as death, immobilization, or serious incapacitation.
Ft-c	Foot candles - a measure of <u>light</u> intensity
Graphical Method	Log concentration versus percent mortality method. Toxicity test data are plotted on 2-cycle semi-log graph paper. The logarithmic axis (y axis) is used for percent effluent concentration, and the linear axis (x axis) is used for percent mortality. The graph provides a reasonably accurate estimate of the LC ₅₀ , but does not provide a confidence interval.
IC	Inhibition Concentration, a point estimate of the toxicant concentration that would cause a given percent reduction in a biological measurement such as fecundity or growth.
LC	Lethal Concentration, identical to EC when the observed response is death.
LC ₅₀	The toxicant concentration that is lethal to 50 percent of exposed organisms at a specific time of observation.
LCL	Lower 95-percent Confidence Limit
LOEC	Lowest-Observed-Effect-Concentration, the lowest concentration of toxicant to which organisms are exposed that causes adverse effects.
LWC	Lab Water Control, moderately hard synthetic freshwater prepared from MILLIPORE MILLI-Q ^R water and reagent grade chemicals.

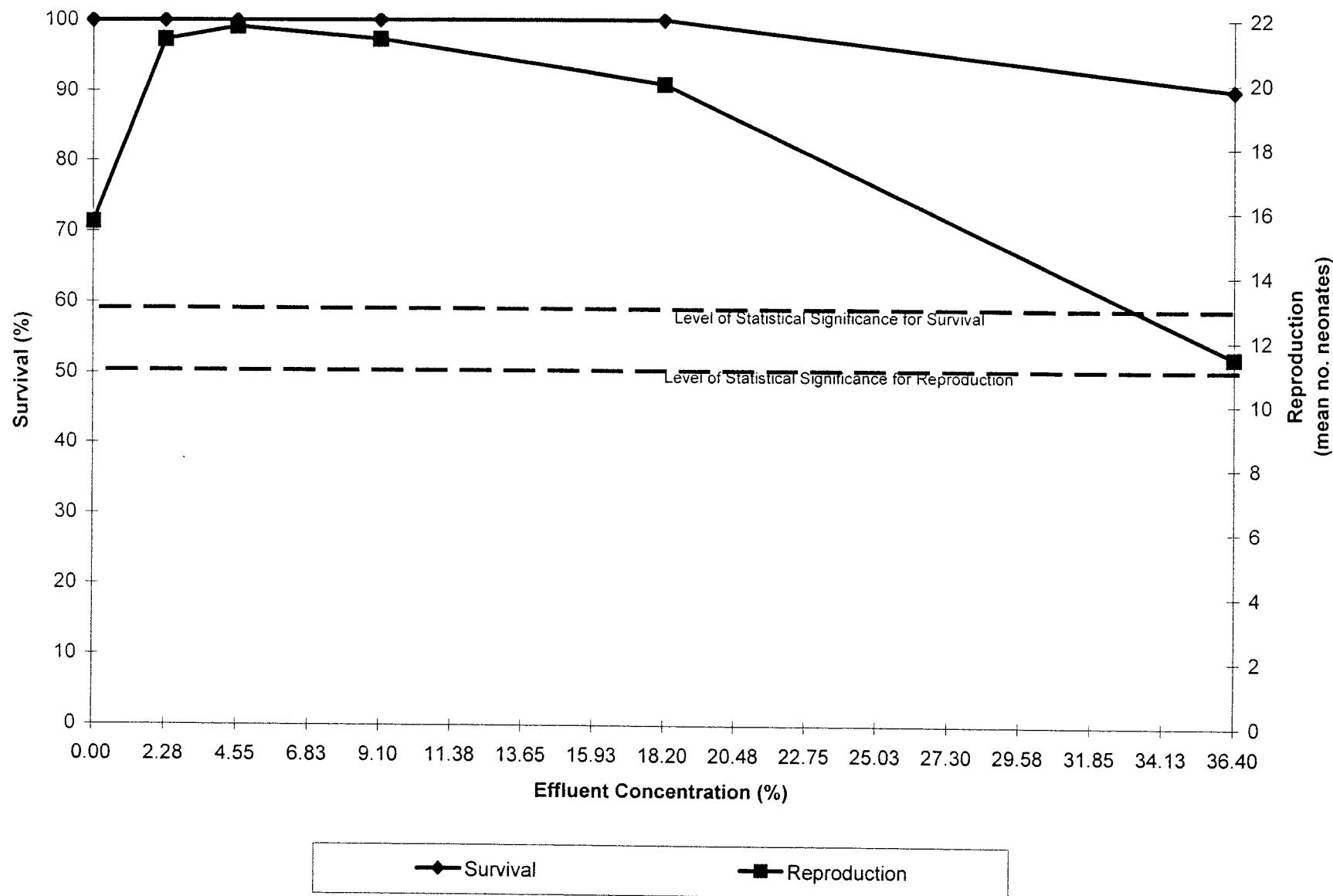
NOEC	No-Observed-Effect-Concentration, the highest concentration of toxicant to which organisms are exposed that causes no observable adverse effects.
Probit Analyses	Probit Analysis consists of a group of statistical methods used to analyze data from concentration-response experiments, and provides an estimate of the LC ₅₀ and the precision of this estimate. In Probit Analysis, the percentages of affected organisms are converted to Probits (probability units), and the effluent concentrations are converted to logarithms. The relationship between the Probits and the logarithmic values of the concentrations is approximately linear. A Probit regression line drawn through the data points is used to estimate the LC ₅₀ and its precision estimate. To use Probit Analysis, at least two partial mortalities must be obtained in the toxicity test.
RWC	Receiving Water Control
UCL	Upper 95-percent Confidence Limit
µE/m ² /s	Micro-ergs per square meter per second - a measure of <u>light</u> intensity

REFERENCES

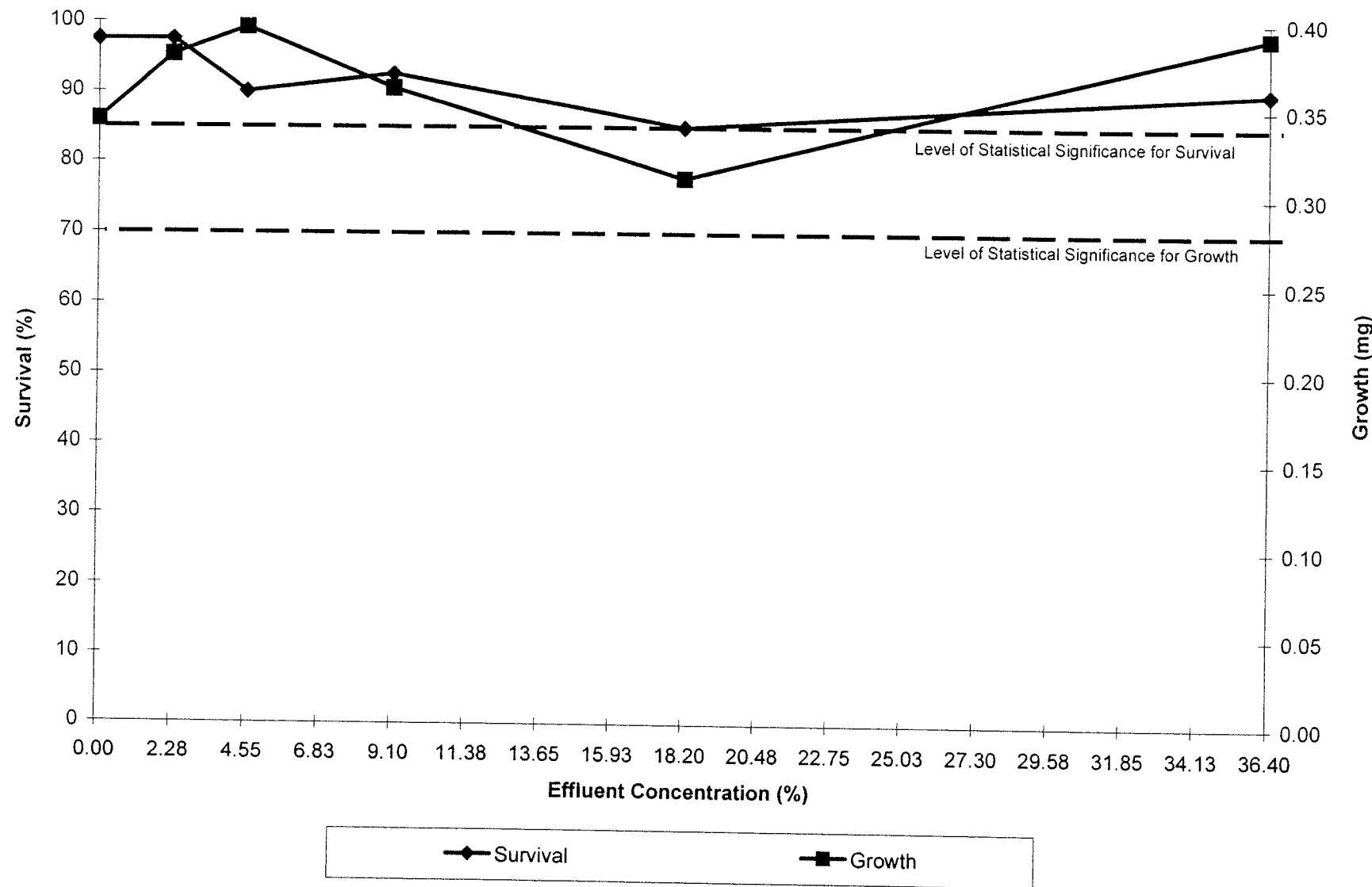
- Gulley, D.D., and WEST, Inc. 1996. TOXSTAT version 3.5. Fish Physiology and Toxicology Laboratory. Department of Zoology and Physiology. University of Wyoming. Laramie, Wyoming.
- U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. Environmental Monitoring Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH. EPA 600/4-79-020.
- U.S. Environmental Protection Agency. 1999. Errata for Effluent and Receiving Water Toxicity Testing Manuals: Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms; Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms; and Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. U.S. Environmental Protection Agency, Office of Research and Development, Duluth, MN. EPA/600/R-98/182.
- U.S. Environmental Protection Agency. 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. Office of Water (4303T), U.S. Environmental Protection Agency, Washington, DC. EPA-821-R-02-013.

FIGURES

**Figure 1. Rayonier WWTP Outfall 001/002 Effluent
Water Flea Chronic Toxicity Test
7/19-26/05**



**Figure 2. Rayonier WWTP Outfall 001/002 Effluent
Fathead Minnow Chronic Toxicity Test**
7/19-26/05



APPENDIX A
Chemical and Physical Data

Summary of Toxicity Test Conditions for the Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test.

1.	Test type:	Static renewal definitive
2.	Temperature (°C):	24.5-26.0°C
3.	Light quality:	Ambient laboratory illumination
4.	Light intensity:	10-20 µE/m ² /s, or 50-100 ft-c
5.	Photoperiod:	16 hrs. light, 8 hrs. darkness
6.	Test chamber size:	400 mL
7.	Test solution volume:	250 mL/replicate
8.	Renewal of test concentrations:	Daily
9.	Age of test organisms:	Newly hatched larvae < 48-hr. old
10.	No. larvae per test chamber:	10
11.	No. replicate chambers per concentration:	4
12.	No. larvae per concentration:	40
13.	Feeding regime:	Fed approximately 0.1 to 0.3 mL newly hatched (less than 24-hr. old) brine shrimp nauplii three times daily. Larvae are not fed during the final 12-hr. of the test.
14.	Cleaning:	Siphoned daily, immediately before test solution renewal
15.	Aeration:	None
16.	Dilution water:	Moderately hard synthetic water prepared using MILLIPORE MILLI-Q ^R and reagent grade chemicals
17.	Effluent concentrations:	Control, 2.28%, 4.56%, 9.11%, 18.2%, and 36.4% effluent
18.	Dilution factor:	0.5
19.	Test duration:	7 days
20.	End points:	Survival and growth (dry weight)
21.	Test acceptability:	80% or greater survival in controls; Average dry weight of surviving controls equals or exceeds 0.25 mg.
22.	Sampling requirement:	A minimum of three samples are collected during testing
23.	Sample volume required:	3.0 L per day

Summary of Toxicity Test Conditions for the Water Flea, *Ceriodaphnia dubia*, Survival and Reproduction Test.

1.	Test type:	Static renewal definitive
2.	Temperature (°C):	24.0-26.0 °C
3.	Light quality:	Ambient laboratory illumination
4.	Light intensity:	10-20 µE/m ² /s, or 50-100 ft-c
5.	Photoperiod:	16-hr. light, 8-hr. darkness
6.	Test chamber size:	30 mL
7.	Test solution volume:	15 mL/replicate
8.	Renewal of test concentrations:	Daily
9.	Age of test organisms:	Newly hatched neonates < 24-hr. old
10.	No. neonates per test chamber:	1
11.	No. replicate chambers per concentration:	10
12.	No. neonates per concentration:	10
13.	Feeding regime:	Fed 0.1 mL each of YCT and algae suspension per test chamber daily
14.	Aeration:	None
15.	Dilution water:	Moderately hard synthetic water is prepared using MILLIPORE MILLI-Q ^R and Perrier.
16.	Effluent concentrations:	Control, 2.28%, 4.56%, 9.11%, 18.2%, and 36.4% effluent
17.	Dilution factor:	0.5
18.	Test duration:	7 days, 60% of control females had 3 broods
19.	End points:	Survival and reproduction
20.	Test acceptability:	80% or greater survival in controls; Average of 15 or more young/surviving female in the control solutions. At least 60% of surviving females in controls should have produced their third brood.
21.	Sampling requirement:	Samples are collected daily, and used within 36-hr. of the time they are removed from the sampling device
22.	Sample volume required:	1.0 L per day

Initial Chemical Characterization of Rayonier WWTP Effluent, LWC, and DMW Used in Short-term Chronic Toxicity Tests, July 19-26, 2005.

Parameter	100% Effluent			Lab Water Control^a	Diluted Mineral Water^b
Sample date (time)	7/17-18/05 (not provided)	7/19-20/05 (not provided)	7/21-22/05 (0700-0700)	7/19/05 (1200)	4/5/05 (1200)
Date received (time)	7/19/05 (1005)	7/21/05 (1015)	7/23/05 (1015)	7/19/05 (1200)	4/5/05 (1200)
Temperature upon receipt (°C)	5.0	4.0	7.0	25.0	25.0
Dissolved Oxygen (mg/L)	4.07	6.62	6.57	7.70	7.68
pH	8.29	8.33	8.44	7.86	7.81
Total Alkalinity as CaCO ₃ (mg/L)	945	820	730	70.0	55.0
Total Hardness as CaCO ₃ (mg/L)	192	224	176	96.0	92.0
Conductivity @25°C (μmhos/cm)	3280	3190	3080	300	191
Residual chlorine (mg/L) ^c	<0.01	<0.01	<0.01	<0.01	<0.01
Ammonia-nitrogen NH ₃ -N (mg/L) ^c	3.98	3.42	2.85	<0.01	<0.01

Unless otherwise noted, all chemical analyses determined according to EPA 600/4-79-020.

^a LWC, moderately hard reconstituted fresh water

^b DMW, diluted mineral water, moderately hard fresh water

^c Determined by Hach Spectrophotometric Test Kit

Prepared by: ASP 9/7/05

Checked by: MET 9/7/05

MACTEC ENGINEERING AND CONSULTING, INC.
BIOTOX LABORATORY
DAILY WATER QUALITY DATA
(STANDARD EPA CHRONIC TOXICITY TEST)

Client: Rayonier

TEST TYPE: Cerio Definitive

DILUTION/CONTROL ID: DMW01071805

Discharge: #1/#2 Outfall Effluent

AERATION REQUIRED: N

ORGANISM ID: CERB01070805

Location: Jesup, GA

TEST CHAMBER SIZE: 30 ml

FOOD TYPE: YCS/Selenastrum

NPDES NO.: _____

TEST SOLUTION VOL: 15 ml

DATE/TIME ORGANISMS FED: 1 X Daily

DATE/ANALYST								COMMENTS
CONTROL: DMW								
D.O.	INITIAL	7.68	7.77	7.68	7.80	7.83	6.97	7.40
pH	INITIAL	8.31	7.95	7.83	7.80	7.88	7.68	8.07
	FINAL							
ALKALINITY								
HARDNESS								
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 2.28%								
D.O.	INITIAL	7.23	7.82	7.62	7.77	7.74	7.76	7.39
pH	INITIAL	8.20	7.91	7.77	7.77	7.98	7.11	8.00
	FINAL							
ALKALINITY								
HARDNESS								
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 4.56%								
D.O.	INITIAL	7.07	7.90	7.59	7.60	7.59	7.23	7.32
pH	INITIAL	8.08	7.90	7.62	7.71	7.75	7.01	7.94
	FINAL							
ALKALINITY								
HARDNESS								
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 9.11%								
D.O.	INITIAL	7.04	7.98	7.55	7.52	7.76	7.40	7.34
pH	INITIAL	8.01	7.90	7.47	7.62	7.62	6.95	7.77
	FINAL							
ALKALINITY								
HARDNESS								
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 18.20%								
D.O.	INITIAL	6.92	7.92	7.50	7.51	7.39	7.45	7.35
pH	INITIAL	7.91	7.67	7.65	7.64	7.60	6.86	7.71
	FINAL							
ALKALINITY								
HARDNESS								
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 36.4%								
D.O.	INITIAL	6.89	7.99	7.52	7.30	7.20	7.43	7.30
pH	INITIAL	7.89	7.83	7.69	7.62	7.57	6.89	7.66
	FINAL							
ALKALINITY								
HARDNESS								
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
D.O. 100%:		4.07		6.62		6.57		
pH 100%:		8.29		8.49		8.44		
Sample ID:		05-0111-01		05-0115-01		05-0116-01		

MACTEC ENGINEERING AND CONSULTING, INC.

BIOTOX LABORATORY

DAILY WATER QUALITY DATA

(STANDARD EPA CHRONIC TOXICITY TEST)

Ryaner
CLIENT: St. Mary's

SAMPLE: Pt. Peter Effluent

LOCATION: St. Mary's, GA

NPDES NO.: _____

TEST TYPE: FHM Definitive

AERATION REQUIRED: N

TEST CHAMBER SIZE: 400 ml

TEST SOLUTION VOL.: 250 ml

DILUTION/CONTROL ID: LWC04071805

ORGANISM ID: CS98107190505

FOOD TYPE: artemia

DATE/TIME ORGANISMS FED: 2 X Daily

DATE/ANALYST								COMMENTS
CONTROL:	LWC							
D.O.	INITIAL	7.70	7.73	7.62	7.58	7.80	7.35	7.71
pH	INITIAL	6.91	6.80	7.27	7.29	7.13	7.43	6.83
ALKALINITY	INITIAL	7.86	6.85	6.99	7.87	7.33	7.46	7.49
HARDNESS	FINAL	7.09	7.21	7.77	7.75	7.87	8.30	8.07
CONDUCTIVITY		55						
TRC mg/l		96						
NH3 mg/l		300						
		20.01						
		6.01						
CONCENTRATION: 2.28%								
D.O.	INITIAL	7.22	7.62	7.56	7.26	7.70	7.30	7.62
pH	INITIAL	7.01	6.89	7.61	7.11	7.00	7.10	6.70
ALKALINITY	FINAL	7.70	7.01	7.18	7.93	7.46	7.68	7.60
HARDNESS		7.72	7.76	7.94	7.99	7.91	8.26	8.14
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 4.56%								
D.O.	INITIAL	7.0	7.50	7.22	7.01	7.25	7.22	7.51
pH	INITIAL	7.26	6.81	6.86	6.47	6.29	7.00	6.26
ALKALINITY	FINAL	7.93	7.72	7.36	8.01	7.59	7.59	7.59
HARDNESS		7.38	7.52	7.95	8.01	8.05	8.15	8.19
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 9.11%								
D.O.	INITIAL	6.86	7.46	7.17	6.94	7.31	7.20	7.47
pH	INITIAL	7.41	6.91	6.80	7.22	5.91	6.34	6.20
ALKALINITY	FINAL	6.01	7.93	7.59	8.16	7.91	7.95	7.62
HARDNESS		8.04	7.97	8.20	9.22	8.4	8.27	8.22
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 18.20%								
D.O.	INITIAL	6.74	7.34	7.08	6.99	7.17	7.14	7.45
pH	INITIAL	7.46	6.95	6.62	6.61	5.68	5.90	5.86
ALKALINITY	FINAL	8.22	8.08	7.52	8.12	8.06	8.17	7.65
HARDNESS		8.05	8.18	8.25	8.19	8.23	8.25	8.29
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
CONCENTRATION: 36.4%								
D.O.	INITIAL	6.96	7.34	7.05	6.80	7.02	7.06	7.43
pH	INITIAL	7.45	6.84	6.57	5.56	4.64	5.66	5.64
ALKALINITY	FINAL	8.32	8.29	8.33	8.22	8.23	8.31	8.08
HARDNESS		8.38	8.32	8.35	8.23	8.28	8.30	8.34
CONDUCTIVITY								
TRC mg/l								
NH3 mg/l								
D.O. 100%:		4.07		6.62		6.57		
pH 100%:		8.29		8.49		8.44		
Sample ID:		05-0111-01		05-0115-01		05-0116-01		

MACTEC ENGINEERING AND CONSULTING
BIOTOX LABORATORY
SPECTROPHOTOMETRIC BENCH SHEET

PARAMETER: CHLORINE	WAVELENGTH: 530 NM
METHOD: HACH PROCEDURES 8167	INSTRUMENT ID: HACH DR/2500
ANALYST: M/J	CURVE REFERENCE: CL2080604
STANDARD REFERENCE: 461	REAGENT REFERENCES:
CLIENT: Rayonier	1) DPD AccuVac: #512
DATE: 7/19/05	

Mg/L CHLORINE = [(Mg/L CURVE x CELL CORR) + (STANDARD + BLANK CORR)]

1

REVIEWED BY: GAP

DATE: 9/7/05

**MACTEC ENGINEERING AND CONSULTING
BIOTOX LABORATORY
TITRIMETRIC BENCH SHEET**

Mg/L HARDNESS = _____

SAMPLE VOLUME

REVIEWED BY: GAP

DATE: 9/6/65

**MACTEC ENGINEERING AND CONSULTING
BIOTOX LABORATORY
TITRIMETRIC BENCH SHEET**

[Vtotal + (BLANK CORR + STD CORR)] x 50,000 x Ntitrant

Mg/L ALKALINITY = _____

REVIEWED BY: ASP

DATE: 8/26/05

MACTEC ENGINEERING AND CONSULTING

BIOTOX LABORATORY

SPECTROPHOTOMETRIC BENCH SHEET

PARAMETER: AMMONIA	WAVELENGTH: 425 NM
METHOD: HACH "PROCEDURES 8038	INSTRUMENT ID: HACH DR/2500
ANALYST: <i>mbr</i>	CURVE REFERENCE: NH30080304
STANDARD REFERENCE: BKII p.163	REAGENT REFERENCES:
CLIENT: Rayonier	1) NESSLER RGT: 424
DATE: 7/19/05	2) MINERAL STABILIZER: 441 3) PVA: 440

Mg/L AMMONIA = [(Mg/L CURVE x CELL CORR) + (STANDARD + BLANK CORR)]

REVIEWED BY: GAP

DATE: 9/7/05

APPENDIX B

Chain of Custody Records

CHAIN OF CUSTODY RECORD

Page 1 of 1

Rayonier Performance Fibers

Jesup Mill - Environmental Dept.
4470 Savannah Highway
Jesup, GA 31545
(912) 427-5350
(912) 427-5145 FAX

Project:

Whole Effluent Toxicity - NPDES Permit renewal

Purchase Order No. na

Relinquished By / Received By (signature): <i>R. Schmidler b JPS</i>	Date / Time 7/18/05 1615 hours.
Relinquished By / Received By (signature): <i>ups</i>	Date / Time
Relinquished By / Received By (signature): <i>Ashen Rake</i>	Date / Time 7/19/05 1005

CHAIN OF CUSTODY RECORD

Page 1 of 1

Rayonier Performance Fibers

Jesup Mill - Environmental Dept.
4470 Savannah Highway
Jesup, GA 31545
(912) 427-5350
(912) 427-5145 FAX

Project:

Whole Effluent Toxicity - NPDES Permit renewal

Purchase Order No. JC538675

~~Befriended By / Received By~~ (signature):

Date / Time:

Relinquished By / Received By (signature):

Date / Time

Relinquished By / Received By (signature):

Date / Time

77105 102

4°C

05-0115-01



CHAPTER ONE: RECORD

MACTEC ENGINEERING AND CONSULTING
BIOTOX LABORATORY
3200 Town Point Drive NW, Suite 100
Kennesaw, GA 30144
(770) 421-3312 • FAX (770) 421-3314

Nº 05257

* FOR VARIABLE VOLUME SUBSAMPLES BASED ON FLOW OR SET TIME INCREMENTS, ATTACH SAMPLE AND FLOW INFORMATION

BIOTOX USE ONLY

ICE PRESENT? YES / N pH _____ RESIDUAL CL _____ D.O. _____ CONDUCTIVITY _____ VISUAL _____

**MATRIX

Distribution: Original Copy Accompany Sample To Laboratory. Yellow Copy Retained By Sampler.

APPENDIX C

Test Organism Documents

MACTEC Engineering and Consulting, Inc.
BioTox Laboratory

***Ceriodaphnia dubia* In-house Culture Source Document**

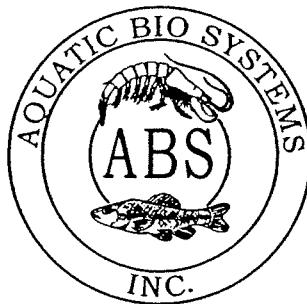
Brood Board ID No.	Brood Board Date	Date/Time Cups Marked	Age of Test Organisms	Water Type/Temp. (°C)	Food Type
CERB01070805	7/8/05	7/19/05 0900	<24-hr	DMW / 25.0	YCT & <i>Selenastrum</i>

MACTEC Engineering and Consulting, Inc.
BioTox Laboratory

***Pimephales promelas* In-house Culture Source Document**

Larvae Batch ID No.	Source	Hatch Date	Age of Test Organisms	Water Type/Temp. (°C)	Food Type
CS981071905	Aquatic BioSystems	7/18/05	<48-hr	LWC / 25.0	<i>Artemia</i>

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 7/18/05

SPECIES: Pimephales promelas

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 7/18/05

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:

Current

Range

TEMPERATURE: 24°C --

SALINITY/CONDUCTIVITY: -- --

TOTAL HARDNESS (as CaCO₃): 126 mg/l --

TOTAL ALKALINITY (as CaCO₃): 95 mg/l --

pH: 7.64 --

Comments:



Sue Keller

Facility Supervisor

05981071905
rec'd 7/19/05 1005

07/19/05

APPENDIX D
Laboratory Test Data Sheets and Statistical Analyses

Fathead Minnow

Effluent Test

Mactec Engineering and Consulting, Inc.
BioTox Laboratory

7-day Fathead Minnow Larval Survival and Growth Test
(EPA-821-R-02-013, 1000.0)

Discharger: Rayonier
 Location: Jesup, GA
 Sample: #1/#2 Outfall Effluent
 Minnow I.D. #: CS981071905

Test Location:
 INC # 3
 Shelf # 1

Concentration	Rep. #	Surviving Organisms (alive/dead)								% Survival
		Day 0	1	2	3	4	5	6	7	
LWC	1	10	10	10	10	10	10	10	10	97.5
LWC	2	10	10	10	10	10	10	10	10	97.5
LWC	3	10	10	10	10	9/1	9	9/1	9	97.5
LWC	4	10	10	10	10	10	10	10	10	97.5
LWC	Temp (°C)	25	24.5	25	25	25.5	25.5	25	25	
2.28%	1	10	10	10	10	10	10	10	10	97.5
2.28%	2	10	10	10	10	10	10	10	10	97.5
2.28%	3	10	10	10	10	10	10	10	10	97.5
2.28%	4	10	10	10	10	10	10	10	10	97.5
2.28%	Temp (°C)	25	24.5	25	26	25.5	25.5	25	25	
4.56%	1	10	10	10	10	9/1	9	9	9	90
4.56%	2	10	10	10	10	10	10	10	10	90
4.56%	3	10	10	10	10	10	10	8/2	8	90
4.56%	4	10	10	10	10	10	9/1	9	9	90
4.56%	Temp (°C)	25	25	25	26	25.5	25.5	25	25	
9.11%	1	10	10	10	10	10	10	10	9/1	92.5
9.11%	2	10	10	10	10	10	10	10	10	92.5
9.11%	3	10	10	10	9/1	9	9	9	9	92.5
9.11%	4	10	10	10	10	9/1	9	9	9	92.5
9.11%	Temp (°C)	25	24.5	25.5	26	25.5	25.5	25	25	
18.20%	1	10	10	9/1	9	9	9	8/1	8	85
18.20%	2	10	10	10	9/1	8/1	8	8	8	85
18.20%	3	10	10	10	9/1	8/1	8	8	8	85
18.20%	4	10	10	10	10	10	10	10	10	85
18.20%	Temp (°C)	25	25	25.5	26	26	26	24.5	25	
36.4%	1	10	10	10	10	10	10	10	10	92.5
36.4%	2	10	10	10	10	9/1	9	9	9	92.5
36.4%	3	10	10	10	10	10	10	10	9/1	92.5
36.4%	4	10	10	10	10	10	10	9/1	9	92.5
36.4%	Temp (°C)	25	25	26	25	26	26	25.5	25	

Sample ID: 05-0111-01
 Comments:

MACTEC ENGINEERING AND CONSULTING, INC.
BIOTOX LABORATORY

Laboratory weight data for larval survival and growth test

Client: Rayonier
 Discharge: #1/#2 Outfall Effluent
 Location: Jesup, GA

Test Dates: 7/19-26/05
 Organism: P. promelas, CS981071905
 Sample ID:

Drying Temp.: 61°C
 Drying Time: 24 h
 Analyst(s): C3

Conc.:	Replicate No.	Weight of boat (gms)	Dry weight: boat and larvae (gms)	Total dry weight of larvae (gms)	Original Number of larvae [day 0]	Mean dry weight per rep. original number of larvae (mg)	Mean dry weight per conc., original number larvae (mg)	Oven Times	
								In	Out
LWC	1	0.95998	0.96306		10			160° 7/26	160° 7/27
	2	0.96188	0.96576						
	3	0.96471	0.96785						
	4	0.95629	0.95994						
2.28%	1	0.96400	0.96799					160° 7/26	160° 7/27
	2	0.95741	0.96125						
	3	0.96200	0.96539						
	4	0.96139	0.96540						
4.56%	1	0.95266	0.95697					160° 7/26	160° 7/27
	2	0.96082	0.96479						
	3	0.95556	0.95939						
	4	0.96129	0.96506						
9.11%	1	0.96307	0.966462					160° 7/26	160° 7/27
	2	0.96212	0.96625						
	3	0.96409	0.96732						
	4	0.96132	0.96488						
18.20%	1	0.95775	0.96059					160° 7/26	160° 7/27
	2	0.96250	0.96573						
	3	0.95947	0.96193						
	4	0.94654	0.95045						
36.40%	1	0.96478	0.96865					160° 7/26	160° 7/27
	2	0.95223	0.95617						
	3	0.95349	0.95787						
	4	0.96088	0.96485						

MACTEC ENGINEERING AND CONSULTING, INC.
BIOTOX LABORATORY

Laboratory weight data for larval survival and growth test

Client: Rayonier
 Discharge: #1/#2 Outfall Effluent
 Location: Jesup, GA

Test Dates: 7/19-26/05
 Organism: P. promela CS981071905

Drying Temp.: 61 C
 Drying Time: 24 hours
 Analyst(s): ASP

Conc.:	Replicate No.	Weight of boat (gms)	Dry weight boat and larvae (gms)	Total dry weight of larvae (gms)	Original Number of larvae [day 0]	Mean dry weight per rep. original number of larvae (mg)	Mean dry weight per conc., original number larvae (mg)	Oven Times	
								In Date: 7/26/2005	Out Date: 7/27/2005
Conc.: LWC	1	0.95998	0.96306	0.00308	10	0.308	0.344	1600	1600
	2	0.96188	0.96576	0.00388	10	0.388		1600	1600
	3	0.96471	0.96785	0.00314	10	0.314		1600	1600
	4	0.95629	0.95994	0.00365	10	0.365		1600	1600
Conc.: 2.280%	1	0.96400	0.96799	0.00399	10	0.399	0.381	1600	1600
	2	0.95741	0.96125	0.00384	10	0.384		1600	1600
	3	0.96200	0.96539	0.00339	10	0.339		1600	1600
	4	0.96139	0.96540	0.00401	10	0.401		1600	1600
Conc.: 4.56%	1	0.95266	0.95697	0.00431	10	0.431	0.397	1600	1600
	2	0.96082	0.96479	0.00397	10	0.397		1600	1600
	3	0.95556	0.95939	0.00383	10	0.383		1600	1600
	4	0.96129	0.96506	0.00377	10	0.377		1600	1600
Conc.: 9.11%	1	0.96307	0.96662	0.00355	10	0.355	0.362	1600	1600
	2	0.96212	0.96625	0.00413	10	0.413		1600	1600
	3	0.96409	0.96732	0.00323	10	0.323		1600	1600
	4	0.96132	0.96488	0.00356	10	0.356		1600	1600
Conc.: 18.20%	1	0.95775	0.96059	0.00284	10	0.284	0.311	1600	1600
	2	0.96250	0.96573	0.00323	10	0.323		1600	1600
	3	0.95947	0.96193	0.00246	10	0.246		1600	1600
	4	0.94654	0.95045	0.00391	10	0.391		1600	1600
Conc.: 36.40%	1	0.96478	0.96865	0.00387	10	0.387	0.392	1600	1600
	2	0.95223	0.95617	0.00394	10	0.394		1600	1600
	3	0.95399	0.95787	0.00388	10	0.388		1600	1600
	4	0.96088	0.96485	0.00397	10	0.397		1600	1600

Prepared by
 Reviewed by

MBA 8/1/05
DP 8/15/05

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))
Number of Groups: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	0 LWC	1	1.0000	1.4120
1	0 LWC	2	1.0000	1.4120
1	0 LWC	3	0.9000	1.2490
1	0 LWC	4	1.0000	1.4120
2	2.28 %	1	1.0000	1.4120
2	2.28 %	2	1.0000	1.4120
2	2.28 %	3	0.9000	1.2490
2	2.28 %	4	1.0000	1.4120
3	4.56 %	1	0.9000	1.2490
3	4.56 %	2	1.0000	1.4120
3	4.56 %	3	0.8000	1.1071
3	4.56 %	4	0.9000	1.2490
4	9.11 %	1	0.9000	1.2490
4	9.11 %	2	1.0000	1.4120
4	9.11 %	3	0.9000	1.2490
4	9.11 %	4	0.9000	1.2490
5	18.2 %	1	0.8000	1.1071
5	18.2 %	2	0.8000	1.1071
5	18.2 %	3	0.8000	1.1071
5	18.2 %	4	1.0000	1.4120
6	36.4 %	1	1.0000	1.4120
6	36.4 %	2	0.9000	1.2490
6	36.4 %	3	0.9000	1.2490
6	36.4 %	4	0.9000	1.2490

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	0 LWC	4	1.2490	1.4120	1.3713
2	2.28 %	4	1.2490	1.4120	1.3713
3	4.56 %	4	1.1071	1.4120	1.2543
4	9.11 %	4	1.2490	1.4120	1.2898
5	18.2 %	4	1.1071	1.4120	1.1834
6	36.4 %	4	1.2490	1.4120	1.2898

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	0 LWC	0.0066	0.0815	0.0407	5.9424
2	2.28 %	0.0066	0.0815	0.0407	5.9424
3	4.56 %	0.0155	0.1246	0.0623	9.9346
4	9.11 %	0.0066	0.0815	0.0407	6.3179
5	18.2 %	0.0232	0.1524	0.0762	12.8815
6	36.4 %	0.0066	0.0815	0.0407	6.3179

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.1960
W = 0.9426

Critical W = 0.8840 (alpha = 0.01 , N = 24)
W = 0.9160 (alpha = 0.05 , N = 24)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 2.2967 (p-value = 0.8068)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 15.0863 (alpha = 0.01, df = 5)
= 11.0705 (alpha = 0.05, df = 5)

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	0.1032	0.0206	1.8950
Within (Error)	18	0.1960	0.0109	
Total	23	0.2991		

(p-value = 0.1453)

Critical F = 4.2479 (alpha = 0.01, df = 5, 18)
= 2.7729 (alpha = 0.05, df = 5, 18)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
 File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 1 OF 2

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	SIG 0.05
1	0 LWC	1.3713	0.9750		
2	2.28 %	1.3713	0.9750	0.0000	
3	4.56 %	1.2543	0.9000	1.5852	
4	9.11 %	1.2898	0.9250	1.1044	
5	18.2 %	1.1834	0.8500	2.5468 *	
6	36.4 %	1.2898	0.9250	1.1044	

Dunnett critical value = 2.4100 (1 Tailed, alpha = 0.05, df = 5, 18)

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Survival
 File: 071905PP.S Transform: ARC SINE(SQUARE ROOT(Y))

Dunnett's Test - TABLE 2 OF 2

Ho: Control < Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	0 LWC	4			
2	2.28 %	4	0.0965	10.0	0.0000
3	4.56 %	4	0.0965	10.0	0.0750
4	9.11 %	4	0.0965	10.0	0.0500
5	18.2 %	4	0.0965	10.0	0.1250
6	36.4 %	4	0.0965	10.0	0.0500

Toxicity at 18.2%
 is anomalous, disregard

NOEC = 36.4%

8/15/05

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth

File: 071905PP.G

Transform:

NO TRANSFORMATION

Number of Groups: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	0 LWC	1	0.3080	0.3080
1	0 LWC	2	0.3880	0.3880
1	0 LWC	3	0.3140	0.3140
1	0 LWC	4	0.3650	0.3650
2	2.28 %	1	0.3990	0.3990
2	2.28 %	2	0.3840	0.3840
2	2.28 %	3	0.3390	0.3390
2	2.28 %	4	0.4010	0.4010
3	4.56 %	1	0.4310	0.4310
3	4.56 %	2	0.3970	0.3970
3	4.56 %	3	0.3830	0.3830
3	4.56 %	4	0.3770	0.3770
4	9.11 %	1	0.3550	0.3550
4	9.11 %	2	0.4130	0.4130
4	9.11 %	3	0.3230	0.3230
4	9.11 %	4	0.3560	0.3560
5	18.2 %	1	0.2840	0.2840
5	18.2 %	2	0.3230	0.3230
5	18.2 %	3	0.2460	0.2460
5	18.2 %	4	0.3910	0.3910
6	36.4 %	1	0.3870	0.3870
6	36.4 %	2	0.3940	0.3940
6	36.4 %	3	0.3880	0.3880
6	36.4 %	4	0.3970	0.3970

✓ ap 8/18/05

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth

File: 071905PP.G Transform: NO TRANSFORMATION

Summary Statistics on Data

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	0 LWC	4	0.3080	0.3880	0.3438
2	2.28 %	4	0.3390	0.4010	0.3808
3	4.56 %	4	0.3770	0.4310	0.3970
4	9.11 %	4	0.3230	0.4130	0.3618
5	18.2 %	4	0.2460	0.3910	0.3110
6	36.4 %	4	0.3870	0.3970	0.3915

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth

File: 071905PP.G Transform: NO TRANSFORMATION

Summary Statistics on Data

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	0 LWC	0.0015	0.0390	0.0195	11.3576
2	2.28 %	0.0008	0.0288	0.0144	7.5768
3	4.56 %	0.0006	0.0242	0.0121	6.0872
4	9.11 %	0.0014	0.0374	0.0187	10.3515
5	18.2 %	0.0038	0.0619	0.0310	19.9063
6	36.4 %	0.0000	0.0048	0.0024	1.2250

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth
File: 071905PP.G Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0246
W = 0.9833

Critical W = 0.8840 (alpha = 0.01 , N = 24)
W = 0.9160 (alpha = 0.05 , N = 24)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth
File: 071905PP.G Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 11.3232 (p-value = 0.0453)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 15.0863 (alpha = 0.01, df = 5)
= 11.0705 (alpha = 0.05, df = 5)

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth
File: 071905PP.G

Transform:

NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	0.0214	0.0043	3.1320
Within (Error)	18	0.0246	0.0014	
Total	23	0.0460		

(p-value = 0.0331)

Critical F = 4.2479 (alpha = 0.01, df = 5, 18)
= 2.7729 (alpha = 0.05, df = 5, 18)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth
File: 071905PP.G Transform:

NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	0 LWC	0.3438	0.3438		
2	2.28 %	0.3808	0.3808	-1.4156	
3	4.56 %	0.3970	0.3970	-2.0373	
4	9.11 %	0.3618	0.3618	-0.6886	
5	18.2 %	0.3110	0.3110	1.2530	
6	36.4 %	0.3915	0.3915	-1.8268	

Dunnett critical value = 2.4100 (1 Tailed, alpha = 0.05, df = 5, 18)

NOB U/
36.4%

Title: Rayonier #1/#2 Outfall 7/19/05 P.promelas Growth
File: 071905PP.G Transform:

NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2

Ho: Control < Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	0 LWC	4			
2	2.28 %	4	0.0630	18.3	-0.0370
3	4.56 %	4	0.0630	18.3	-0.0533
4	9.11 %	4	0.0630	18.3	-0.0180
5	18.2 %	4	0.0630	18.3	0.0327
6	36.4 %	4	0.0630	18.3	-0.0478

< 0.2908

is
sig.

Water Flea

Effluent Test

MACTEC ENGINEERING AND CONSULTING, INC.

BIOTOX LABORATORY

Daily survival and reproduction data for Ceriodaphnia dubia chronic test

Client: Rayonier

Discharge: #1/#2 Outfall Effluent

Location: Jesup, GA

Cup #1	DMW	Cup #2 =	2.28%	Cup #3 =	4.56%	Cup #4 =	9.11%	Cup #5 =	18.20%	Cup #6 =	36.4%
--------	-----	----------	-------	----------	-------	----------	-------	----------	--------	----------	-------

Dilution Water ID: DMW01071805

C. dubia Source ID: CERB01070805

Template ID: *

Test Set-up Date (day 0): 7/19/05

Test Set-up Time: 1300

Test Set-up Analyst: JW

DAILY RENEWAL DATES, TIMES, TEMPS, AND ANALYST'S INITIALS											
Day 1: 7/20/05	Day 2: 7/21/05	Day 3: 7/22/05	Day 4: 7/23/05	Day 5: 7/24/05	Day 6: 7/25/05	Day 7: 7/26/05					
Time: 1245	Time: 1500	Time: 1615	Time: 1315	Time: 1001	Time: 1400	Time: 1300					
Initials: JW	Initials: JW	Initials: JW	Initials: JW	Initials: JW	Initials: JW	Initials: JW					

MF = molten embryo
MC = molten carapace

J = alive adult
X = dead adult

= no. live neonates
-# = no. dead neonates

MA = missing adult
Y = male adult

GA = gravid adult
EA = ephippial adult

SA = small adult
NB = neonates on bottom

Day	Cup 5	Cup 15	Cup 25	Cup 35	Cup 45	Cup 55	Day	Cup 10	Cup 20	Cup 30	Cup 40	Cup 50	Cup 60
0	✓	✓	✓	✓	✓	-	0	-	-	-	-	-	-
1	✓	✓	✓	✓	✓	✓	1	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	2	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
4	✓3	✓4	✓	✓4	✓3	✓4	4	✓1	✓5	✓2	✓4	✓3	✓
5	✓	✓	✓	✓	✓	✓	5	✓	✓6	✓	✓10	✓4	✓11
6	✓3	✓9	✓5	✓6	✓4	✓10	6	✓3	✓10	✓1	✓14	✓4	✓11
7	✓10	✓10	✓13	✓5	✓8	✓10	7	✓13	✓	✓4	✓	✓18	✓
Day	Cup 4	Cup 14	Cup 24	Cup 34	Cup 44	Cup 54	Day	Cup 9	Cup 19	Cup 29	Cup 39	Cup 49	Cup 59
0	-	-	-	-	-	-	0	-	-	-	-	-	-
1	-	-	✓	-	-	-	1	-	-	-	-	-	-
2	-	✓	✓	✓	✓	✓	2	-	✓	✓	-	-	-
3	-	✓	✓	✓	✓	✓	3	-	-	-	-	-	-
4	-4	✓2	✓2	✓4	✓3	✓3	4	✓2	✓3	✓4	✓	✓3	✓4
5	✓13	✓	✓9	✓10	✓14	✓10	5	✓4	-	✓	✓	✓	✓4
6	✓10	✓8	✓6	✓8	✓12	✓12	6	✓10	✓3	✓5	✓4	✓5	✓10
7	✓	✓	✓7	✓	✓	✓	7	✓13	✓5	✓15	✓8	✓11	✓
Day	Cup 3	Cup 13	Cup 23	Cup 33	Cup 43	Cup 53	Day	Cup 8	Cup 18	Cup 28	Cup 38	Cup 48	Cup 58
0	-	-	-	-	-	-	0	-	-	-	-	-	-
1	-	✓	✓	✓	✓	✓	1	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	2	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
4	✓3	✓3	✓2	✓3	✓4	✓1	4	✓3	✓3	✓3	✓3	✓3	✓4
5	✓	✓4	✓2	✓4	✓	✓5	5	✓	✓6	✓4	✓5	✓	✓
6	✓14	✓20	✓10	✓10	✓2	✓11	6	✓4	✓10	✓7	✓5	✓6	✓6
7	✓	✓	✓	✓	✓5	✓	7	✓9	✓	✓12	✓2	✓2	✓8
Day	Cup 2	Cup 12	Cup 22	Cup 32	Cup 42	Cup 52	Day	Cup 7	Cup 17	Cup 27	Cup 37	Cup 47	Cup 57
0	-	-	-	-	-	-	0	-	-	-	-	-	-
1	-	-	-	-	-	-	1	-	-	-	-	-	-
2	✓	✓	✓	✓	✓	✓	2	✓	✓	✓	✓	✓	✓
3	✓3	✓	✓1	✓1	✓1	✓2	3	✓	✓	✓	✓	✓	✓
4	✓	✓	✓1	✓1	✓1	✓2	4	✓3	✓4	✓3	✓2	✓8	✓2
5	✓	✓	✓	✓	✓	✓	5	✓9	✓2	✓	✓	✓4	✓7
6	✓5	✓6	✓5	✓8	✓6	✓3	6	✓10	✓2	✓7	✓6	✓60	✓
7	✓8	✓10	✓5	✓14	✓7	✓8	7	✓	✓9	✓13	✓11	✓	✓
Day	Cup 1	Cup 11	Cup 21	Cup 31	Cup 41	Cup 51	Day	Cup 6	Cup 16	Cup 26	Cup 36	Cup 46	Cup 56
0	-	-	-	-	-	-	0	-	-	-	-	-	-
1	-	-	-	-	-	-	1	-	-	-	-	-	-
2	✓	✓	✓	✓	✓	✓	2	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓2	✓	✓2	4	✓2	✓2	✓3	✓2	✓	✓3
5	✓9	✓5	✓4	✓1	✓5	✓	5	✓3	✓	✓	✓	✓	✓
6	✓	✓6	✓5	✓5	✓1	✓6	6	✓6	✓4	✓4	✓4	✓6	✓6
7	✓6	✓15	✓13	✓20	✓10	✓1	7	✓7	✓7	✓12	✓6	✓15	✓15

Temperature (°C)					
Day	Cup #1	Cup #11	Cup #21	Cup #31	Cup #41
0	25	25	25	25	25
1	25	25	25	25	25
2	25.5	25.5	25.5	26	26.0
3	25	25	25	25	25.5
4	25	25	25	25	25.5
5	25	25	25	25	25
6	25	25	25	25	25
7	24.5	24.5	24	24	24.5

Test Location	
INC #	003
SHELF #	05

Lab Sample ID:

Days 0,1,2: 05-0111-01
Days 3,4: 05-0115-01
Days 5,6,7: 05-0116-01

MACTEC ENGINEERING AND CONSULTING, INC.
BIOTOX LABORATORY
Ceriodaphnia dubia 3-brood chronic test de-randomization sheet

Client: Rayonier	Dilution Water ID: DMW01071805	Test Set-up Date (Time): 7/19/2005 (1300)			
Discharge: #1/#2 Outfall Effluent	C. dubia Source ID: CERB01070805	Test End Date (Time): 7/26/05 (1300)			
Location: Jesup, GA	Template ID: *	Test Analyst(s): ASP			
Cup #1 = DMW	Cup #2 = 2.28%	Cup #3 = 4.56%	Cup #4 = 9.11%	Cup #5 = 18.20%	Cup #6 = 36.40%

Behavior Key					
ME = molten embryo	A = alive adult	# = no. live neonates	MF = missing adult	GA = gravid adult	SA = small adult
MC = molten carapace	X = dead adult	-# = no. dead neonates	Y = male adult	EA = ephippial adult	NB = neonates on bottom

Cup #	DMW							Total Neonates	
	Day								
0	1	2	3	4	5	6	7		
1	A	A	A	A	A	9	A	15	
12	A	A	A	A	A	6	10	16	
53	A	A	A	A	1	5	11	A	17
24	A	A	A	A	2	5	6	7	20
45	A	A	A	A	3	A	4	8	15
36	A	A	A	A	2	A	4	6	12
17	A	A	A	A	4	A	2	9	15
58	A	A	A	A	4	A	6	8	18
39	A	A	A	A	A	A	4	8	12
10	A	A	A	A	1	A	3	13	17
Original no. of females:	10	Live neonates per female:	15.7	157					

Cup #	2.28%							Total Neonates	
	Day								
0	1	2	3	4	5	6	7		
11	A	A	A	A	A	5	6	15	
42	A	A	A	A	1	A	6	7	14
33	A	A	A	A	3	4	10	A	17
4	A	A	A	A	4	13	10	A	27
25	A	A	A	A	A	5	13	A	18
56	A	A	A	A	A	3	6	15	24
37	A	A	A	A	2	A	6	11	19
8	A	A	A	A	3	A	4	9	16
29	A	A	A	A	4	A	5	15	24
50	A	A	A	A	3	4	4	18	29
Original no. of females:	10	Live neonates per female:	21.4	214					

Cup #	4.56%							Total Neonates	
	Day								
0	1	2	3	4	5	6	7		
21	A	A	A	A	4	5	13	22	
32	A	A	A	A	1	A	8	14	23
3	A	A	A	A	3	A	14	A	17
54	A	A	A	A	3	10	12	A	25
15	A	A	A	A	4	A	9	10	23
46	A	A	A	A	A	6	15		21
7	A	A	A	A	3	9	10	A	22
28	A	A	A	A	2	A	7	12	21
49	A	A	A	A	3	A	5	11	19
20	A	A	A	A	5	10	10	A	25
Original no. of females:	10	Live neonates per female:	21.8	218					

Cup #	9.11%							Total Neonates	
	Day								
0	1	2	3	4	5	6	7		
31	A	A	A	A	2	A	1	20	
52	A	A	A	A	2	A	3	8	13
13	A	A	A	A	3	4	20	A	27
44	A	A	A	A	3	14	12	A	29
5	A	A	A	A	3	A	3	10	16
26	A	A	A	A	3	A	4	12	19
47	A	A	A	A	8	4	10	A	22
18	A	A	A	A	3	6	10	A	19
59	A	A	A	A	4	4	10	A	18
40	A	A	A	A	4	10	14	A	28
Original no. of females:	10	Live neonates per female:	21.4	214					

Cup #	18.20%							Total Neonates
	Day							
0	1	2	3	4	5	6	7	
41	A	A	A	A	5	6	10	21
2	A	A	A	3	A	5	8	16
23	A	A	A	2	2	10	A	14
34	A	A	A	4	10	8	A	22
55	A	A	A	4	6	10	A	20
16	A	A	A	2	A	4	7	13
27	A	A	A	3	A	7	13	23
48	A	A	A	3	5	10	2	20
9	A	A	A	2	4	10	13	29
60	A	A	A	A	11	11	A	22
Original no. of females:	10	Live neonates per female:	20.0	200				

Cup #	36.40%							Total Neonates	
	Day								
0	1	2	3	4	5	6	7		
51	A	A	A	A	2	A	6	1	9
22	A	A	A	A	1	A	5	5	11
43	A	A	A	A	4	A	2	5	11
14	A	A	A	A	2	A	8	A	10
35	A	A	A	A	4	A	6	5	15
6	A	A	A	A	2	3	6	7	18
57	A	A	A	A	2	X7			9
38	A	A	A	A	3	4	5	2	14
19	A	A	A	A	3	A	3	5	11
30	A	A	A	A	2	A	1	4	7
Original no. of females:	10	Live neonates per female:	11.5	115					

Comments:

Entered by: MBR 8/1/05
 Checked by: CGP 8/15/05

Non

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction

File: 071905CD.R

Transform:

NO TRANSFORMATION

Number of Groups: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	0 DMW	1	15.0000	15.0000
1	0 DMW	2	16.0000	16.0000
1	0 DMW	3	17.0000	17.0000
1	0 DMW	4	20.0000	20.0000
1	0 DMW	5	15.0000	15.0000
1	0 DMW	6	12.0000	12.0000
1	0 DMW	7	15.0000	15.0000
1	0 DMW	8	18.0000	18.0000
1	0 DMW	9	12.0000	12.0000
1	0 DMW	10	17.0000	17.0000
2	2.28 %	1	26.0000	26.0000
2	2.28 %	2	14.0000	14.0000
2	2.28 %	3	17.0000	17.0000
2	2.28 %	4	27.0000	27.0000
2	2.28 %	5	18.0000	18.0000
2	2.28 %	6	24.0000	24.0000
2	2.28 %	7	19.0000	19.0000
2	2.28 %	8	16.0000	16.0000
2	2.28 %	9	24.0000	24.0000
2	2.28 %	10	29.0000	29.0000
3	4.56 %	1	22.0000	22.0000
3	4.56 %	2	23.0000	23.0000
3	4.56 %	3	17.0000	17.0000
3	4.56 %	4	25.0000	25.0000
3	4.56 %	5	23.0000	23.0000
3	4.56 %	6	21.0000	21.0000
3	4.56 %	7	22.0000	22.0000
3	4.56 %	8	21.0000	21.0000
3	4.56 %	9	19.0000	19.0000
3	4.56 %	10	25.0000	25.0000
4	9.11 %	1	23.0000	23.0000
4	9.11 %	2	13.0000	13.0000
4	9.11 %	3	27.0000	27.0000
4	9.11 %	4	29.0000	29.0000
4	9.11 %	5	16.0000	16.0000
4	9.11 %	6	19.0000	19.0000
4	9.11 %	7	22.0000	22.0000
4	9.11 %	8	19.0000	19.0000
4	9.11 %	9	18.0000	18.0000
4	9.11 %	10	28.0000	28.0000
5	18.2 %	1	21.0000	21.0000
5	18.2 %	2	16.0000	16.0000
5	18.2 %	3	14.0000	14.0000
5	18.2 %	4	22.0000	22.0000
5	18.2 %	5	20.0000	20.0000
5	18.2 %	6	13.0000	13.0000
5	18.2 %	7	23.0000	23.0000
5	18.2 %	8	20.0000	20.0000
5	18.2 %	9	29.0000	29.0000
5	18.2 %	10	22.0000	22.0000

6	36.4 %	1	9.0000	9.0000
6	36.4 %	2	11.0000	11.0000
6	36.4 %	3	11.0000	11.0000
6	36.4 %	4	10.0000	10.0000
6	36.4 %	5	15.0000	15.0000
6	36.4 %	6	18.0000	18.0000
6	36.4 %	7	9.0000	9.0000
6	36.4 %	8	14.0000	14.0000
6	36.4 %	9	11.0000	11.0000
6	36.4 %	10	7.0000	7.0000

✓ app 8/15/05

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction

File: 071905CD.R

Transform:

NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

***** Shapiro - Wilk's Test is aborted *****

This test can not be performed because total number of replicates
is greater than 50.

Total number of replicates = 60

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction

File: 071905CD.R

Transform:

NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.0200	14.5200	22.9200	14.5200	4.0200
OBSERVED	2	15	26	14	3

Chi-Square = 1.7222 (p-value = 0.7867)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction
File: 071905CD.R Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 10.0956 (p-value = 0.0726)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 15.0863 (alpha = 0.01, df = 5)
= 11.0705 (alpha = 0.05, df = 5)

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction

File: 071905CD.R

Transform:

NO TRANSFORMATION

Summary Statistics on Data

TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	0 DMW	10	12.0000	20.0000	15.7000
2	2.28 %	10	14.0000	29.0000	21.4000
3	4.56 %	10	17.0000	25.0000	21.8000
4	9.11 %	10	13.0000	29.0000	21.4000
5	18.2 %	10	13.0000	29.0000	20.0000
6	36.4 %	10	7.0000	18.0000	11.5000

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction

File: 071905CD.R

Transform:

NO TRANSFORMATION

Summary Statistics on Data

TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	0 DMW	6.2333	2.4967	0.7895	15.9023
2	2.28 %	27.1556	5.2111	1.6479	24.3509
3	4.56 %	6.1778	2.4855	0.7860	11.4014
4	9.11 %	28.7111	5.3583	1.6944	25.0387
5	18.2 %	22.2222	4.7140	1.4907	23.5702
6	36.4 %	10.7222	3.2745	1.0355	28.4737

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction
File: 071905CD.R Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	866.9333	173.3867	10.2776
Within (Error)	54	911.0000	16.8704	
Total	59	1777.9333		

(p-value = 0.0000)

Critical F = 3.3769 (alpha = 0.01, df = 5,54)
= 2.3861 (alpha = 0.05, df = 5,54)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction
 File: 071905CD.R Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	0 DMW	15.7000	15.7000		
2	2.28 %	21.4000	21.4000	-3.1031	
3	4.56 %	21.8000	21.8000	-3.3209	
4	9.11 %	21.4000	21.4000	-3.1031	
5	18.2 %	20.0000	20.0000	-2.3409	
6	36.4 %	11.5000	11.5000	2.2865	

Dunnett critical value = 2.3100 (1 Tailed, alpha = 0.05, df [used] = 5,40)
 (Actual df = 5,54)

Title: Rayonier #1/#2 Outfall 7/19/05 C.dubia reproduction
 File: 071905CD.R Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	0 DMW	10			
2	2.28 %	10	4.2432	27.0	-5.7000
3	4.56 %	10	4.2432	27.0	-6.1000
4	9.11 %	10	4.2432	27.0	-5.7000
5	18.2 %	10	4.2432	27.0	-4.3000
6	36.4 %	10	4.2432	27.0	4.2000

≤ 11.46 is

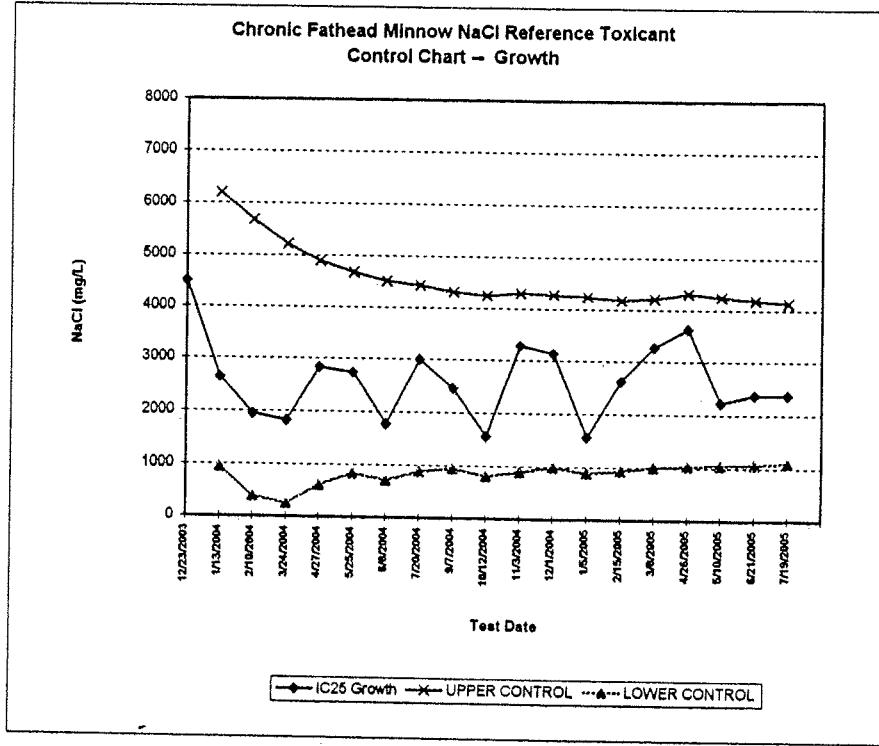
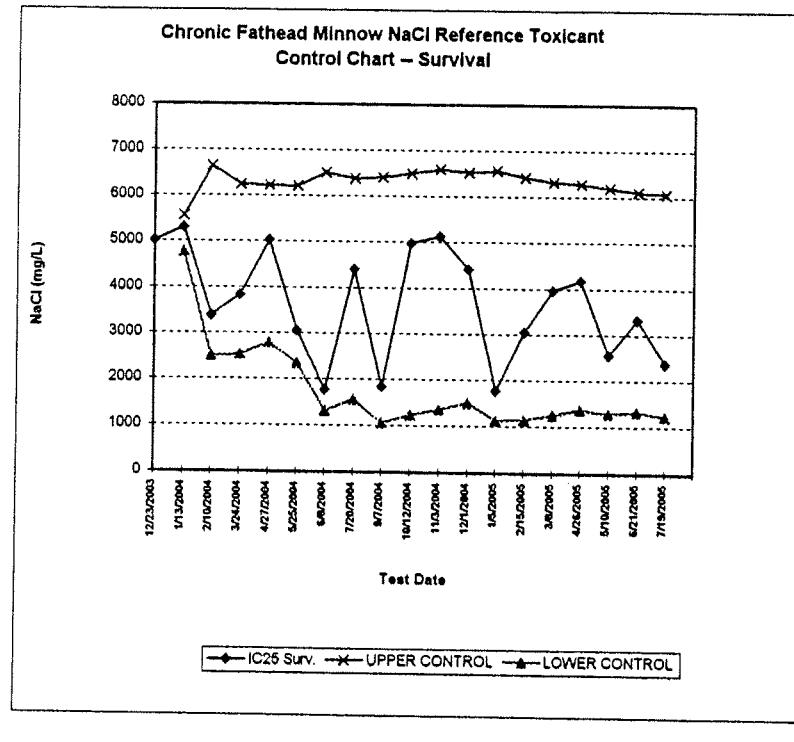
sign

Fathead Minnow

Reference Toxicant Test

2. pro. Chor. Cl Reference Toxicant Data

TEST NO.	INITS	DATE	IC25 Surv (Ac-Sine)	CUM MEAN IC25	CUM SD (+2x Cum SD)	UPPER CONTROL (+2x Cum SD)	LOWER CONTROL (-2x Cum SD)	IC25 Growth (Ac-Sine)	CUM MEAN IC25	CUM SD (+2x Cum SD)	UPPER CONTROL (+2x Cum SD)	LOWER CONTROL (-2x Cum SD)
149	ASP	12/23/2003	5020	5020				4502	4500			
150	ASP	1/13/2004	5305	5160	200	5560	4760	2643	3570	1310	6190	950
151	ASP	2/10/2004	3371	4570	1040	6650	2490	1942	3030	1320	5670	390
152	ASP	3/24/2004	3822	4380	930	6240	2520	1823	2730	1240	5210	250
153	ASP	4/27/2004	5031	4510	860	6230	2790	2837	2750	1070	4890	610
154	ASP	5/25/2004	3048	4270	970	6210	2330	2736	2750	960	4670	830
155	ASP	6/8/2004	1762	3910	1300	6510	1310	1771	2610	950	4510	710
156	ASP	7/20/2004	4400	3970	1210	6390	1550	2999	2660	890	4440	880
157	ASP	9/7/2004	1832	3730	1340	6410	1050	2451	2630	840	4310	950
158	ASP	10/12/2004	4977	3860	1320	6500	1220	1560	2530	860	4250	810
159	ASP	11/3/2004	5136	3970	1310	6590	1350	3292	2600	850	4300	900
160	ASP	12/1/2004	4415	4010	1260	6530	1490	3136	2640	820	4280	1000
161	ASP	1/5/2005	1756	3840	1360	6560	1120	1559	2560	840	4240	880
162	ASP	2/15/2005	3044	3780	1320	6420	1140	2615	2560	810	4180	940
163	ASP	3/8/2005	3970	3790	1270	6330	1250	3282	2610	800	4210	1010
164	ASP	4/26/2005	4176	3820	1230	6280	1360	3637	2670	820	4310	1030
165	ASP	5/10/2005	2541	3740	1230	6200	1280	2217	2650	800	4250	1050
166	ASP	6/21/2005	3331	3720	1200	6120	1320	2366	2630	780	4190	1070
167	ASP	7/19/2005	2366	3650	1210	6070	1230	2369	2620	760	4140	1100



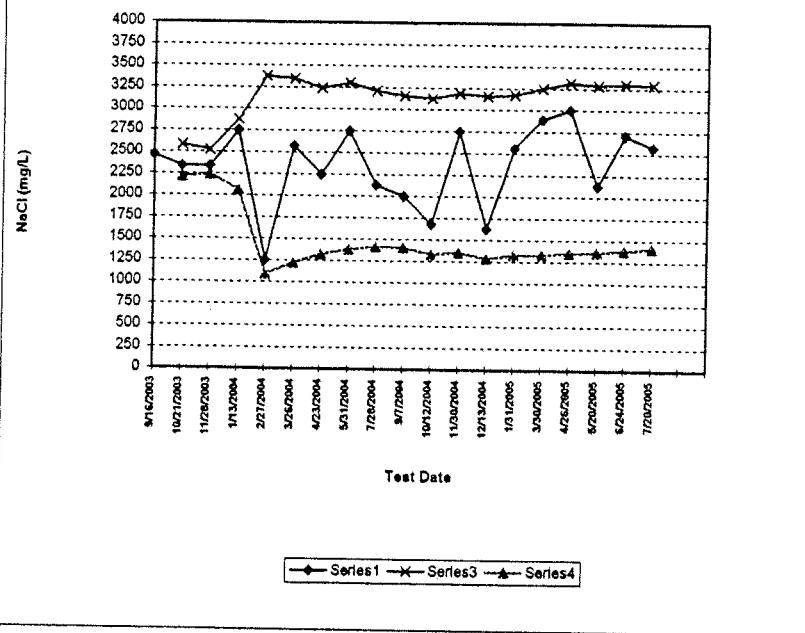
Water Flea

Reference Toxicant Test

C. dubia Chronic NaCl Reference Toxicant Data

Test No.	Init.	Date	C25_Survive	Cumulative Mean	Cumulative Std	GU PPER CONTROL	LOWER CONTROL	C25_Reprod	Cumulative Mean	CUM SD	UPPER CONTROL	LOWER CONTROL
			(Arc-Sine)	I C25	(+ 2 cum SD)	(- 2 cum SD)	I C25	(+ 2 cum SD)	(- 2 cum SD)			
121	ASP/MRF	9/16/2003	2461	2460				1199	1200			
122	ASP/MRF	10/21/2003	2333	2400	90	2580	2220	823	1010	270	1550	470
123	ASP	11/28/2003	2333	2380	70	2520	2240	1196	1070	220	1510	630
124	ASP	1/13/2004	2750	2470	200	2870	2070	1092	1080	180	1440	720
125	ASP	2/27/2004	1250	2230	570	3370	1090	1199	1100	160	1420	780
126	ASP	3/26/2004	2571	2280	530	3340	1220	1124	1110	150	1410	810
127	ASP	4/23/2004	2250	2280	480	3240	1320	483	1020	270	1560	480
128	ASP	5/31/2004	2750	2340	480	3300	1380	1099	1030	250	1530	530
129	ASP	7/28/2004	2125	2310	450	3210	1410	1233	1050	250	1550	550
130	ASP	9/7/2004	2000	2280	440	3160	1400	764	1020	250	1520	520
131	ASP	10/12/2004	1681	2230	450	3130	1330	717	990	250	1490	490
132	ASP	11/30/2004	2750	2270	460	3190	1350	930	990	240	1470	510
133	ASP	12/13/2004	1625	2220	470	3160	1280	1259	1010	240	1490	530
134	ASP	1/31/2005	2563	2250	460	3170	1330	1231	1020	240	1500	540
135	ASP	3/30/2005	2889	2290	480	3250	1330	1341	1050	250	1550	550
136	ASP	4/26/2005	3000	2330	490	3310	1350	1152	1050	240	1530	570
137	ASP	5/20/2005	2125	2320	480	3280	1360	1099	1060	230	1520	600
138	ASP	6/24/2005	2708	2340	480	3300	1380	1185	1060	230	1520	600
139	ASP	7/20/2005	2571	2350	470	3290	1410	1173	1070	220	1510	630

Chronic C. dubia NaCl Reference Toxicant Control Chart – Survival



Chronic C. dubia NaCl Reference Toxicant Control Chart – Reproduction

